

COUPLING BETWEEN TWO TUBES WITH SEPARATE SET-UP CLAMPS

The invention relates to a coupling between a first body with a hole, for instance a cylindrical hole with an axis, and a cylindrical end zone of a for instance tubular second body to be arranged therein or therearound in an axial direction, in which hole extend a number of elastically deformable tongues which are connected to the relevant body and ordered at mutual angular distances, the free end edges of which tongues lie substantially on the peripheral plane of an imaginary, substantially rotation-symmetrical body, the diameter of which is smaller than the outer diameter of the end zone of the second body, which tongues extend at an angle to the axial direction such that, when said end zone is inserted, they bend elastically in the insertion direction and scrape over the surface thereof with their free edges such that after insertion of the end zone over some distance the movement in backward direction relative to the insertion direction is blocked.

Such a coupling is known from EP-A-0 378 035, EP-A-0 212 883, EP-A-0 579 194, EP-A-0 294 948, EP-A-0 972 981 and DE-A-197 23 594. Relative to this stated prior art it is an object of the invention to embody a coupling between two bodies such that it can be released very easily without specific uncoupling operations and the use of tools intended specifically for this purpose, while in the coupled situation the bodies are nevertheless coupled to each other very firmly and even, ostensibly, inseparably.

These and other objects are realized with a coupling of the type specified in the preamble which has the feature that each tongue forms part of a generally U-shaped clip fixable clampingly over the mouth rim of the first body, and that the end edges of the tongues have an inclining position corresponding to a part of a helix, as a consequence of which, when the second body is rotated around the axis relative to the first body, the form of said helix is followed so that an axial

relative movement also occurs and said end zone of the second body can be removed from the first body.

The tongues can extend on the inner side of the hole but, alternatively, can also be situated on the surface of said end zone. It is recommended for safety reasons when the coupling is effected that the tongues are situated inside the hole, since there is otherwise the danger of the person effecting the coupling being injured by the possibly sharp tongues.

The clips can consist of any suitable material. A sufficiently strong plastic such as for instance ABS is therefore suitable. Cheaper and very reliable is an embodiment where the tongues consist of metal, in particular steel.

According to another aspect of the invention, the coupling according to the invention has the special feature that each tongue has a main direction in axial projection which differs from the radial direction and is in a direction opposite the direction of rotation when the end zone of the second body is moved outward. A more or less radially directed additional force is hereby exerted on each tongue during rotation of the cylindrical end zone of the second body, whereby the ring has a slight tendency to expand, which somewhat facilitates the helical rotation.

In a specific embodiment, the coupling according to the invention has the special feature that the first body has an axial stop for bounding the distance over which said end zone of the second body can be inserted into the hole. Using this embodiment the coupling can be effected in very simple manner by inserting the cylindrical end zone of the second body with some axial force into the cylindrical hole in the first body, wherein the axial insertion distance is determined by said axial stop. This axial stop can for instance be embodied as an annular shoulder, against which the leading side of the end zone of the second body comes to lie.

According to yet another aspect of the invention, the coupling can have the special feature that at least said end zone of the second body consists of plastic,

concrete, wood or metal, such as iron, copper or aluminium. It is important that the material of the tongues is chosen such that it can co-act effectively in the above described manner with the material of the

5 second body.

In order to prevent unintended displacement of each clip in the situation where the bodies must be separated from each other by relative rotation, use can be made of means preventing such a rotation. The coupling can have
10 for this purpose the special feature that each clip has at least one protrusion which during mutual rotation of the two bodies in the stated manner braces itself against the material of the body to which the ring is connected. A clip can also be fixed with glue and/or be
15 received more or less close-fittingly in a recess.

A coupling according to the invention can for instance be applied for the coupling of two tubes. A two-sided coupling sleeve can thus for instance be coupled at both its ends to respective tubes by means of
20 two associated couplings according to the invention. Such a sleeve can optionally be an outer sleeve or an inner sleeve. In the case of an outer sleeve, the connection between the tubes for coupling to each other can be realized such that these tubes come to rest with
25 their free end edges against each other. A completely medium-tight sealing can further be ensured by making use of suitable sealing means, for instance sealing rings present on the inner surface of the outer sleeve.

What is important is that an established coupling
30 cannot be released by exerting only an axial tensile force on the two bodies. The connection by means of the coupling according to the invention can only be released by mutually rotating the bodies in the above described manner.

35 The invention also relates to a clip which is adapted to form part of a coupling of the above specified type, which clip has a general U-shape and can be fixed clampingly over the mouth rim of the tubular first body, and has a protruding, elastically deformable
40 tongue, the free end edge of which has an inclining

position relative to the direction of arrangement of the clip.

The invention will now be elucidated on the basis of the accompanying drawings.

5 In the drawing:

Fig. 1 shows a perspective view of a coupling between two tubes according to the invention at a stage where the tubes to be mutually coupled still lie a distance apart;

10 Fig. 2 shows the detail II of Fig. 1 on larger scale; and

Fig. 3 shows a side view corresponding to the perspective view of Fig. 1.

Fig. 1 and show in the manner of an exploded view a coupling according to the invention between a first tube 15 1 and a second tube 6. The first tube 1 has a widened end zone 2 into which fits a sealing ring 3.

A cylindrical mounting ring 4 further fits into the widened end zone 2. In this embodiment this mounting 20 ring 4 is provided with an interruption or incision 7 which ensures that ring 4 fits into the widened end zone 2 with some play and resiliently.

Although not strictly necessary, this aspect may be important in some circumstances in respect of the basic 25 principle of the invention, according to which use is made of a number of generally U-shaped clips 5 with cutting tongues. In this embodiment these clips 5 are not placed directly over the mouth rim of the first tube but are arranged clampingly over mounting ring 4. Arrows 30 8 indicate the direction in which clips 5 are arranged on mounting ring 4.

Fig. 2 shows that each clip 5 has on its outer side (in the situation in which the clip 5 is placed on mounting rim 4) a scraping tongue 9 directed obliquely 35 inward. The end edge 10 thereof scrapes over the outer surface 11 of mounting ring 4 when clip 5 is arranged. A backward movement is thus blocked effectively. Any other movement is also blocked after clip 5 has been pressed on fixedly, this being important for reasons to be 40 described below.

Situated on the inner side is an inward extending cutting tongue 12 with an end edge 13 having an inclining position corresponding to a part of a helix. This inclining position is important for reasons to be described below. The inclining position of end edges 13 of all tongues is the same.

Once tongues 5 have been arranged with force over mounting ring 4 in the shown manner, the mounting ring is placed in the widened end zone 2 and pressed on with some force. Sealing ring 3 is hereby accommodated therein. It does however continue to protrude to the extent that it can fulfil its sealing function to be described below.

After the first tube has been provided in the above described manner with O-ring 3 and mounting ring 4 with clips 5, this thus formed unit is ready for coupling to the second tube 6. This has a diameter such that it can pass end edges 13 of cutting tongues 12 with some force and with elastic deformation thereof. In order to ensure a good sealing between first tube 1 and second tube 6 the insertion displacement is continued until mouth rim 14 co-acts sealingly under some pressure with sealing ring 3, which on its other side co-acts sealingly under pressure with the step-like transition between first tube 1 and the widened end zone 2 thereof.

The now effected coupling cannot be released by exerting a relative backward displacement of second tube 6. According to the invention however, it is still possible to remove the second tube. For this purpose it can be rotated relative to first tube 1. The helical form defined by end edges 13 of cutting tongues 12 is thereby followed such that second tube 6 also executes a relative axial movement, and can thus be removed in the manner of a screw from first tube 1, 2, mounting ring 4 and cutting tongues 12.

A more or less tangential force is exerted on each of the cutting tongues 12 by this rotating movement. Owing to the above mentioned presence of scraping tongues 9 the clips 5 are not able to perform any movement as a result of this tangential force. The clips are therefore fixed firmly in their position.

During insertion and unscrewing of second tube 6 it is not possible to avoid the outer surface thereof respectively displaying scratch-marks and a set of helical scores. These plastic deformations will however
5 be relatively superficial and not affect proper operation of the coupling between tubes 1 and 6.

Clips 5 could also be arranged directly on tube 1. This tube 1 would in that case not have to have a widened end part. The drawback of such a coupling is
10 that the clips are visible on the outside and accessible. This is not very attractive either visually or technically. In the drawn and described exemplary embodiment the clips are wholly accommodated in the widened end zone. This is an attractive option both
15 visually and technically.

Attention is drawn to the fact that in the case of tubes with differing diameters the clips 5 could be arranged on the tube with the smaller diameter such that the cutting tongues are situated on the outside instead
20 of on the inside as in the drawn and described exemplary embodiment. The second tube is not then inserted but arranged over the first tube and the clips 5.

Diverse modifications in components of the coupling according to the invention and their mutual connection
25 are thus possible without departing from the scope of the invention.

CLAIMS

5 1. Coupling between a first body with a hole, for
instance a cylindrical hole with an axis, and a
cylindrical end zone of a for instance tubular second
body to be arranged therein or therearound in an axial
direction, in which hole extend a number of elastically
10 deformable tongues which are connected to the relevant
body and ordered at mutual angular distances, the free
end edges of which tongues lie substantially on the
peripheral plane of an imaginary, substantially
rotation-symmetrical body, the diameter of which is
15 smaller than the outer diameter of the end zone of the
second body, which tongues extend at an angle to the
axial direction such that, when said end zone is
inserted, they bend in the insertion direction and
scrape over the surface thereof with their free edges
20 such that after insertion of the end zone over some
distance the movement in backward direction relative to
the insertion direction is blocked,

characterized in that

each tongue forms part of a generally U-shaped clip
25 fixable clampingly over the mouth rim of the first body,
and that

the end edges of the tongues have an inclining
position corresponding to a part of a helix, as a
consequence of which, when the second body is rotated
30 around the axis relative to the first body, the form of
said helix is followed so that an axial relative
movement also occurs and said end zone of the second
body can be removed from the first body.

35 2. Coupling as claimed in claim 1, wherein each
clip consists of metal, in particular steel.

3. Coupling as claimed in any of the foregoing
claims, wherein each tongue has a main direction in
40 axial projection which differs from the radial direction

and is in a direction opposite the direction of rotation when the end zone of the second body is moved outward.

4. Coupling as claimed in any of the foregoing
5 claims, wherein the first body has an axial stop for bounding the distance over which said end zone of the second body can be displaced relative to the first body during arranging.

10 5. Coupling as claimed in any of the foregoing claims, wherein at least said end zone of the second body consists of plastic, concrete, wood or metal, such as iron, copper or aluminium.

15 6. Coupling as claimed in any of the foregoing claims, wherein each clip comprises means which prevent displacement of the clip during rotation of the second body relative to the first body.

20 7. Coupling as claimed in claim 6, wherein each clip has at least one protrusion which during mutual rotation of the two bodies in the stated manner braces itself against the material of the body to which the ring is connected.

25 8. Clip adapted to form part of a coupling as claimed in any of the foregoing claims, which clip has a general U-shape and can be fixed clampingly over the mouth rim of the tubular first body, and has a
30 protruding, elastically deformable tongue, the free end edge of which has an inclining position relative to the direction of arrangement of the clip.